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ORIGINAL ARTICLE

Consumers' willingness to pay for organic rice: Insights from a non-hypothetical experiment in Indonesia

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Abstract

As in many high-income countries, there is increasing awareness towards organic farming in many low- and middle-income countries. Sustained local demand is an essential requirement for further adoption of organic farming by smallholders, who typically have only limited access to export markets. Until now, only few studies have explored the local willingness to pay (WTP) for organic products in low- and middle-income countries in real purchase situations. This paper analyses the consumers' WTP for organic rice in urban and suburban Indonesia using an incentive-compatible auction based on the Becker–DeGroot–Marschak (BDM) approach. We further study the effect of income and a randomised information treatment about the benefits of organic food on respondents' WTP. Estimates suggest that respondents are willing to pay an average price premium of 20% compared with what they paid for conventional rice outside our experiment. However, our results also indicate that raising consumers' WTP further is complex. Showing participants a video about health or, alternatively, environmental benefits of organic food was not effective in further raising WTP. The results can be used as a basis for the design of alternative awareness measures to increase knowledge, interest and demand for organic food.

KEYWORDS

BDM, Indonesia, organic food, rice, willingness to pay

JEL CLASSIFICATION

D12, O13, Q13

1 | INTRODUCTION

Despite efforts to promote organic farming in parts of South and Southeast Asia, it remains a marginal activity in these regions, as it does all over the world. Large-scale adoption of organic farming requires that consumer prices for organic products exceed production costs, in particular in the absence of substantial subsidy programmes. Organic farming is usually associated with higher costs due to higher labour intensity and lower yields, although the latter is disputed and seems to depend on local conditions and the crop type under study (Froehlich et al., 2018; Jouzi et al., 2017). Since many smallholders have no access to export markets, sufficient local demand is important to raise the adoption rates of organic farming in low- and middle-income countries (Jouzi et al., 2017). Learning about local consumers' willingness to pay (WTP) and how it can be enhanced is therefore of interest to policymakers, environmentalists, farmers and other stakeholders promoting organic consumption in this context.

Previous studies have consistently shown that many consumers, mostly in high-income countries, are indeed willing to pay a price premium for organic products (for reviews, see Hamm and Rödiger (2015) and Katt and Meixner (2020)). However, only a few studies have explored this issue in low- and middle-income countries. Results from existing studies indicate that results are not easily transferable to other products and country contexts. Probst et al. (2012), for example, found an average price premium of 19% for meals that contain only certified organic vegetables in West Africa. By contrast, Ha et al. (2019) found evidence for a much higher price premium of 100% for organic choy sum on markets in rural Vietnam and even 200% in urban Vietnam. The transferability of results across study contexts likely relies on many factors, including the food category, the similarity of the retail market structure, consumers' price consciousness, cultural aspects, environmental consciousness and public awareness about environmental problems associated with conventional food production. Therefore, conclusions about other markets can only be drawn with limitations, and the differing results highlight the need for more primary studies, especially in low- and middle-income countries.

Generally, in resource-poor settings, food can be considered a normal good; therefore, one would expect that the demand for food increases with income. In such a context, poor households will have to focus more on quantity than quality. Hence, across the income distribution, one may observe a substitution from lower to higher quality food items as income increases. Yet, the empirical evidence from low- and middle-income countries with respect to organic food is mixed. Some studies found that both household income and consumer prices play an important role in determining the uptake of organic food (Boys et al., 2014; Katt & Meixner, 2020; My et al., 2018; Nandi et al., 2016). Probst et al. (2012), by contrast, found no significant relationship between income and WTP in their sample of West African countries, and Wahida et al. (2013) even found a negative relationship in Indonesia.

This paper examines consumers' WTP for organic rice in Indonesia. We elicit consumers' WTP for certified organic rice through an incentive-compatible auction mechanism based on the Becker–DeGroot–Marschak (BDM) approach. Our contribution to the literature is twofold. First, it is one of the few studies on WTP for organic products in a lower middle-income country and we build our analysis on a rich set of data that contain, in addition to the revealed WTP, further information such as price expectations and consumption intentions. Indonesia constitutes a particularly interesting case because the government and various NGOs actively promote organic farming, while at the same time, consumers' awareness of organic food is still relatively low (David & Ardiansyah., 2017). In contrast to a previous study conducted in Indonesia which relied on stated WTP (Wahida et al., 2013), we use an incentive-compatible elicitation approach, which is less prone to a potential 'hypothetical bias' (List & Gallet, 2001). We explore the role of household income and discuss the magnitude of the estimated WTP with respect to the potential of local demand. Second, this article uses randomised low-cost health and environmental information interventions

to explore whether these can effectively increase consumers' WTP for organic food. The literature suggests that health and environmental food attributes motivate the purchase of organic food (for reviews, see e.g. Hughner et al. (2007) and Hemmerling et al. (2015)). Yet, only a few empirical studies investigated the role of these food attributes in determining consumers' WTP, with rather mixed results (Batte et al., 2007; My et al., 2018; Rousseau & Vranken, 2013; Wier et al., 2008). In particular, this is one of the first studies to causally assess the effect of additional information (rather than pre-existing health or environmental concerns) on consumers' WTP for organic food. We further expand the discussion on the role of these food attributes by comparing the effect of information on revealed WTP and stated consumption intention. Related studies found, for example, that additional information on certification increased respondents' WTP for sustainable rice in Vietnam (My et al., 2018) and that information on the state of the world's fish stock and the purpose of the Marine Stewardship Council increased respondents' WTP for eco-labelled products in Japan (Uchida et al., 2014). However, given the different country context and food attributes under consideration in this study, it remains unclear whether additional information on perceived health benefits and environmental friendliness will also raise WTP for organic rice in Indonesia.

The remainder of this paper is organised as follows: Section 2 describes the country context. Section 3 outlines the conceptual framework. Section 4 describes the experimental set-up, sample characteristics and statistical analysis. Section 5 presents the results. Section 6 discusses the results and Section 7 concludes.

2 | CONTEXT

This study is set in the Special Region of Yogyakarta (hereafter Yogyakarta), Java. As in many other regions in Indonesia, agriculture in Yogyakarta is associated with poverty. This makes it even more important that any proposed alternative to the currently practised agricultural methods is economically viable for farmers. Hence, price premiums are important to increase the attractiveness of organic farming among farmers.

Currently, the Indonesian agricultural sector is characterised by high levels of chemical inputs. The overapplication of chemical inputs has long been associated with land degradation in Indonesia (Simatupang & Timmer, 2008). In addition to land degradation, biodiversity loss and water pollution are further important concerns, which are associated with chemical-intensive conventional farming. Concerns about the adverse environmental impacts of chemical-intensive conventional farming have prompted various initiatives that promote organic farming (David & Ardiansyah., 2017). Introduced by local nongovernmental organisations in the 1980s, organic farming started to attract policymakers' interest in the early 2000s. In 2001, the Ministry of Agriculture launched the 'Go Organic 2010' campaign, which envisioned Indonesia becoming one of the world's main producers of organic food by 2010. Although it did not achieve this goal, this initiative still provides the impetus towards the institutionalisation of Indonesia's organic farming sector (Jahroh, 2010).

Organic rice is currently the most important organic product in terms of export volume and domestic consumption (David & Ardiansyah., 2017). Yet, due to the high costs and strict requirements for international certification, most smallholders cannot access the export market. At the time of our study (2018), organic rice prices differed greatly across points of sale in Yogyakarta. Local farmers, for example, asked prices as low as IDR 13,000 (US$ 0.96) per kilo for uncertified organic rice[1] and IDR 15,000 (US$ 1.10) per kilo for cer-

[1]In this paper, we only refer to white rice and not to other rice types such as brown or red rice.

tified organic rice (however, it should be noted that these farmers received financial support for the certification). By contrast, supermarkets sold organic certified rice for around IDR 20,000 (US$ 1.47) per kilo. Despite an increasing number of supermarkets in Indonesia, most urban consumers continue to buy rice and other food products at traditional markets, small local food shops or directly from the farmer. In 2018, prices for conventionally grown rice ranged between IDR 9500 (US$ 0.70) and IDR 13,500 (US$ 0.99) at traditional markets in Yogyakarta. Quality determinants explain most of this price range (e.g. rice variety or freshness).

3 | CONCEPTUAL FRAMEWORK AND HYPOTHESES

Following Lancaster (1966), we assume that consumers derive utility from a bundle of different attributes rather than from the product itself. Consumers' motivation to pay a price premium for organic food thus depends on food attributes that differentiate it from conventionally produced food. We suggest that there are at least three food attributes, which may motivate consumers to pay a price premium for organic food: health benefits, environmental benefits and higher quality (see Figure 1). The selection of these food attributes is based on the existing literature on the motivation for organic food purchase, which indicates that especially health and environmental attributes, but also aspects such as taste, motivate the purchase of organic food (for a review see Hughner et al., 2007). The perceived *health benefits* of organic food over conventional food include the absence of chemical residues and higher nutritional quality. *Environmental benefits* derive from the different ways that organic farming is more 'environmentally friendly' than conventional farming. *Higher quality* refers to aspects such as taste and freshness. However, as Custodio et al. (2019) showed, quality perception often differs among consumers, contexts and geographic areas.

Assuming that consumers value the described food attributes and trust that the product is produced according to organic principles, we derive the following hypotheses:

Hypothesis 1. Consumers are willing to pay a price premium for organic food.

We assume that consumers who perceive and value the attributes of organic food show a higher WTP for it, i.e. are willing to pay a higher price for organic food than for conventional food. Yet, financial constraints may force poorer consumers to focus more on quantity than quality to meet their dietary requirements. This means that even if poor households have a

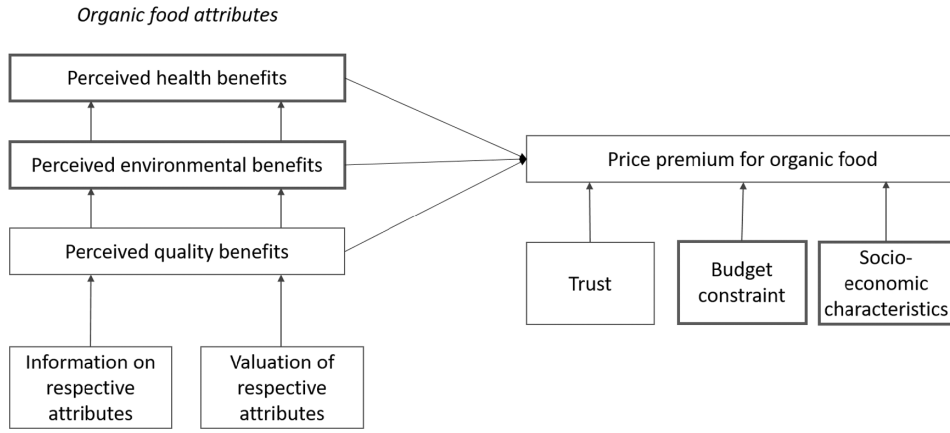

FIGURE 1 Conceptual framework for determinants of WTP premium for organic food. Source: Own representation

high preference for organic food, their income constraints might be binding. This leads us to our second hypothesis:

Hypothesis 2. A consumer's WTP for organic food increases with income.

Lastly, consumers differ in terms of their exposure to information about organic food and their valuation of organic food attributes, which in turn implies differences in their WTP. We expect that informing consumers about a beneficial organic food attribute increases their WTP. This takes us to:

Hypothesis 3a. Information on health benefits increases a consumer's WTP for organic food.

Hypothesis 3b. Information on environmental benefits increases a consumer's WTP for organic food.

Socio-economic characteristics such as age, education, gender and household size might also be correlated with the willingness to pay a price premium for organic food. This framework, shown in Figure 1, assumes that socio-economic characteristics only have a direct influence on the WTP. In reality, these characteristics will also determine income and affect exposure to information and how this information is processed. Yet, given our sample size of less than 300 respondents and hence limited power, an empirical analysis of such interactions is beyond the scope of this paper.

4 | EXPERIMENTAL SET-UP

4.1 | Design and implementation

We chose rice for our experiment as it is frequently purchased by almost all consumers in Indonesia (Reardon et al., 2014). Furthermore, organic rice is among the most important organic food products in Indonesia in terms of production volume (although still smaller than conventionally produced rice). Finally, rice perishes slowly, which makes it easier to use in an experimental setting than vegetables or fruits. We used certified rice to increase people's trust in the organic quality of the rice. Indonesian consumers are generally familiar with the concept of certification as other certificates such as 'halal' are common. The rice for the experiment was purchased from a local organic farmer in Yogyakarta.

We used the BDM approach to elicit respondents' WTP for organic rice (Becker et al., 1964). Using the BDM method, respondents make a price bid to purchase the product. This bid is subsequently compared with a randomly drawn price. Respondents can only purchase the product if their bid is at or above the randomly drawn price. In this case, they pay the randomly drawn price and receive the product. We opted for the BDM approach because, unlike other approaches, it provides an incentivised measure to reveal consumer preferences. If respondents overstate their real reservation price, they might (depending on the drawn price) have to buy the product at a price higher than their actual valuation. By contrast, by understating the real reservation price, respondents might miss a purchase opportunity at a price that was less than or equal to their valuation. Another useful feature of the BDM approach is that it allows observation of exact point-of-purchase prices, i.e. it allows drawing a detailed demand curve (Cole et al., 2020). Thereby, it provides more precise information on the respondents' WTP than a take-it-or-leave-it approach. Furthermore, a growing number of empirical studies have used the BDM approach in low- and middle-income countries, and there is evidence that WTP estimates align well with actual market outcomes in these contexts (Mastenbroek et al., 2021). While the BDM approach was

deemed most suitable in the context of this study, there are also debates on whether it is truly incentive-compatible, especially if respondents are not maximising their expected utility (Horowitz, 2006). Furthermore, there are concerns that the BDM approach is complex and difficult to understand (Alphonce & Alfnes, 2017; Grimm et al., 2020). To address this concern, enumerators demonstrated the bidding process in detail using a graphical illustration with a different product.

We combined the BDM approach with two information treatments to investigate whether information on perceived health or environmental benefits can effectively increase consumers' WTP for organic food. Respondents were randomly assigned to either one of the two treatment groups or to the control group by assigning households to treatments in the order they were interviewed. Each information treatment consisted of a short video, providing information about either the perceived health benefits of organic food or the environmental benefits of organic farming. In both videos, a local organic farmer shares his personal experience. The control group was not shown a video but only briefly verbally introduced to the basic principles of organic farming.

The experiment was conducted only in urban and suburban areas of Yogyakarta because rural households are more likely to be rice producers themselves or purchase rice directly from farmers in their village. We used a two-stage random sampling procedure on the community and household level to select the respondents for this study. In the first stage, we sampled 19 areas in Yogyakarta. In the second stage, households were randomly selected by enumerators, who set out from a mosque in a randomly assigned direction (for more details on the sampling procedure, see Appendix S2).

The overall procedure of the experiment is as follows: first, the enumerator introduced the study to the members of the household and informed them about the opportunity to purchase 1 kg of certified organic rice. The enumerator then invited the household member who is usually responsible for food shopping to take part in an interview. Having obtained the respondent's consent to participate in the study, the enumerator explained the experiment in detail using a graphical illustration. The enumerator emphasised that the experiment included an actual transaction and that the respondent would have to purchase the rice if she or he won the bidding game. Following the explanation and time to inspect the rice, respondents in the treatment groups were shown the respective information video. Then, all respondents were asked to submit a price bid for 1 kg of certified organic rice. The price distribution was not announced to avoid any anchoring effects or strategic bidding. After submitting their bid, respondents drew a price out of the price pool. Respondents who submitted a bid higher or equal to the drawn price purchased the rice for the drawn price.

After the WTP experiment, the respondents were interviewed using a structured survey questionnaire (for details on the rundown of the experiment and the questionnaire, see Appendix S3). Respondents received no financial incentive for their participation. When approaching potential participants, we explained the procedure and the experiment in great detail to ensure that prospective participants understood the bidding game. Before the start of the experiment, we asked each participant for his/her consent to enrol him/her in the study. Finally, we asked the community head (the dusun/keluruhan head) for permission to conduct the survey and experiment.[2]

[2]The research team obtained a research permit for fieldwork on organic farming from the Indonesian Ministry of Research. In the following, we provide further details with respect to ethical considerations concerning the data collection and experiment. First, participants were free to decline and several indeed declined, stating no interest or a lack of time as the reason. Furthermore, respondents were free to opt-out of participation at any time. Second, as respondents were asked to use their own money if they won the bidding game, enumerators took great care to explain that the experiment could entail a real purchase. Most respondents seem to have understood the bidding procedure very well. However, still, a few respondents decided against purchasing the rice despite winning the bidding action. While the price distribution was not disclosed, the distribution was biased towards the lower end to ensure that respondents do not have to overpay. Rice is frequently purchased in Indonesia and not being able to purchase the product in our experiment should not be related to any negative consequences regarding participants' well-being. Similarly, as rice is relatively low in price, making a purchase is unlikely to affect the financial well-being of respondents.

For a more detailed discussion of the ethical aspects related to this study, see Appendix S4. The experiment was carried out in April 2018.

4.2 | Sample characteristics

Table 1 summarises the results of the survey. The majority of the respondents were female (71%), married (92%) and Muslim (86%). Respondents were on average 45.5 years old, and the educational attainment was on average 12.8 years of schooling. This is slightly higher than average years of schooling in Yogyakarta City (11.4 years) and might be due to the

TABLE 1 Variable description and sample characteristics ($N = 293$)

Variable	Description	Mean (SD)
Socio-economic characteristics		
Female	1 = female; 0 otherwise	0.71
Age	Age of the respondent in years	45.51 (12.83)
Married	1—married; 0 otherwise	0.92
Religion		
Muslim	1—Muslim; 0 otherwise	0.86
Christian	1—Christian; 0 otherwise	0.12
Other religion	1—neither Muslim nor Christian; 0 otherwise	0.02
Years of schooling	Completed years of schooling in years	12.80 (3.79)
Household size	Household size (number of people living under the same roof)	4.32 (1.50)
Income		
Income group 1	1—household income is below IDR 2 million; 0 otherwise	0.25
Income group 2	1—household income is between IDR 2–5 million; 0 otherwise	0.55
Income group 3	1—household income is above IDR 5 million; 0 otherwise	0.20
Perception of environmental pollution and organic consumption		
Perceived env. pollution	1—respondent perceives exposure to env. pollution as high or very high	0.19
Perceived benefits of organic consumption		
Healthier	1—respondent perceives organic food to be healthier	0.83
Environmentally friendly	1—respondent perceives organic food to be environment friendly	0.05
Quality	1—1espondent perceives organic food to be of higher quality	0.06
Purchasing behaviour		
Past organic rice purchase	1—respondent purchased organic rice in the past; 0 otherwise	0.47
Last rice purchase price	Price respondent paid for 1 kg of rice in IDR last time respondent bought rice	11,448 (1605)
Expected organic rice price	Market price respondent expects for 1 kg of certified organic rice	15,585 (3615)

focus on (sub)urban areas (Bappeda Jogja, 2020). Since respondents were reluctant to answer direct questions about income, we asked respondents which of the following three income groups their household belonged to: a monthly household income (1) below IDR two million (US$ 147.06), (2) between IDR two million and IDR five million (US$ 367.65) and (3) above IDR five million. IDR two million corresponds roughly to the minimum wage in Yogyakarta, and households that fall in the first category might be classified as relatively poor. In our sample, around 26% of the respondents reported that their household was in the lowest income group 1. Slightly more than half of the respondents (53%) reported that their household was in income group 2, while 21% of the respondents reported that their household was in income group 3, the highest income group. The average household size was 4.3 persons. When asked about their exposure to environmental pollution, 19% of respondents reported that their perceived level of exposure is high or very high. We further asked respondents which characteristics they attribute to organic food. Almost 80% of the respondents stated that they perceive organic food to be healthier than conventionally produced food.

Balance tests indicate no systematic difference between the treatment groups and the control group (for details, see Appendix Table S1). In the majority of cases, pairwise differences between characteristics of respondents in different groups are not statistically significant. While there are statistically significant differences for some variables, in most cases, the significance levels are low. In our analysis, we address this potential source of bias by introducing these variables as controls. Table S1 in the Appendix further provides the variable means for each group.

4.3 | Empirical specification

To test Hypothesis 1, we simply compare the revealed WTP for organic rice and the recall price, that is the price the respondent reportedly paid during the last (nonorganic) rice purchase. Additionally, we use a second benchmark and compare revealed WTP to the common price for high-quality conventional rice. This should give us a relatively close estimate of the premium the respondent is willing to pay for the attributes that distinguish organic rice from conventional rice, i.e. health, environmental and quality attributes. Yet, it should be noted that this is only an estimate rather than the exact WTP as part of the offered price might reflect food attributes that are unrelated to organic rice such as the purchasing environment (during an experiment rather than at the farmer/market/supermarket). Indeed, some studies found that the point of purchase (e.g. different store types) influences WTP for organic food (Ellison et al., 2016).

In line with our conceptual framework, we then regress respondents' WTP for 1 kg of organic rice on income group, information treatment and on additional socio-economic characteristics. Given the absence of zero bids and the continuous character of our dependent variable, we estimate a linear regression model of the following form:

$$WTP_{ij} = \beta_0 + \beta_1 I_{ij} + \beta_2 H_{ij} + \beta_3 E_{ij} + \beta_4 X_{ij} + \varepsilon_{ij},$$

where the index i indicates the respondent and j the area of residence. Other possible specifications such as a Tobit model are reported in the 'Robustness analysis' section below.

To analyse the relationship between income and respondents' WTP (hypothesis 2), we include the vector I_{ij} which encompasses two binary variables capturing whether respondents' household income is in the middle-income group or in the high-income group, respectively. The low-income group serves as the reference category. Two dummy variables, H_{ij} and E_{ij}, are included to analyse the role of the health and environment information treatment

(hypotheses 3a and 3b), respectively. These dummies take the value of one if respondent *i* in area *j* was shown the respective informational video. For respondents in the control group, both dummies take the value zero. Additionally, we include a vector X_{ij} which controls for respondents' individual and household characteristics, perceptions about benefits of organic food consumption and perceived exposure to environmental pollution as well as purchasing behaviour. Standard errors are clustered at the area level.

We further re-estimate the regression model above but with consumption intention instead of the revealed WTP being the outcome variable. During the survey, respondents were asked whether they plan to consume organic products in the future (with the answer options: 'yes', 'maybe' and 'no'). In our main estimation specification, we code both 'yes' and 'maybe' as 'one' and 'no' as 'zero'. However, we also test other coding possibilities and show the results of a probit model for the binary outcome and of an ordered probit model (in the Appendix S1).

5 | RESULTS

5.1 | Revealed WTP

Table 2 shows that respondents were willing to pay an average price of IDR 13,788 (US$ 1.01) for 1 kg of certified organic rice. The price bids ranged from IDR 9000 (US$ 0.66) to IDR 25,000 (US$ 1.84). Comparing the bids for organic rice and the price that participants reportedly paid the last time they bought conventional rice suggests that participants are on average willing to pay a price premium of 20.1% for organic rice compared with the rice price they commonly pay. High-quality rice (at local markets) was priced at around IDR 12,000 (US$ 0.88) to IDR 13,500 (US$ 0.99) at the time of the study. Thus, the average offered price for organic rice lies slightly above the upper bound for high-quality rice. Overall, this provides support for our first hypothesis and suggests that, on average, consumers value the food attributes that differentiate organic rice from conventional rice. The majority of respondents (74%) offered a higher price, 17% offered the same price and 9% offered a lower price for the organic rice than the last price paid for conventional rice. One hundred and ninety-four respondents (66%) submitted bids above or equal to the randomly drawn price and hence purchased the organic rice.

TABLE 2 Bidding game outcomes (in IDR), full sample and by treatment status

	Full sample	Health information treatment group	Environment information treatment group	No video group
Mean bid amount	13,788	14,037	13,705	13,588
	(2974)	(3111)	(2991)	(2808)
	$N = 293$	$N = 108$	$N = 88$	$N = 97$
Mean reported price of conventional rice	11,448	11,613	11,489	11,228
	(1605)	(1637)	(1821)	(1326)
	$N = 293$	$N = 108$	$N = 88$	$N = 97$
Expected price for organic rice	15,585	15,378	15,766	15,645
	(3615)	(3191)	(3668)	(4003)
	$N = 261$	$N = 94$	$N = 79$	$N = 88$

Note: Standard deviation in parenthesis.

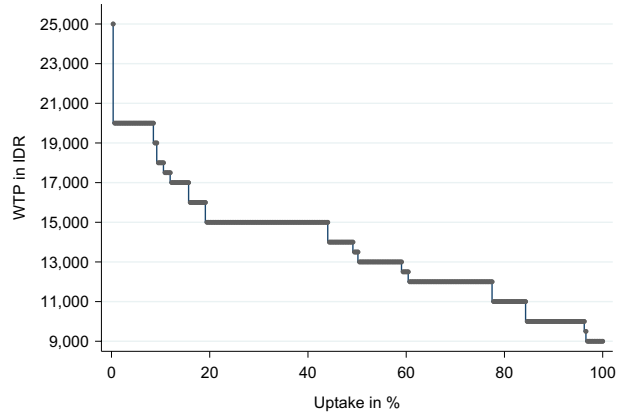

FIGURE 2 Demand curve (full sample). Source: Own representation [Colour figure can be viewed at wileyonlinelibrary.com]

Figure 2 shows the demand curve.[3] From this curve, one can read the uptake for specific prices.[4] For example, around 44% of the sample would take up organic rice for IDR 15,000 (US$ 1.10), the price for which we purchased the rice directly from the farmer. To reach at least 80% of the sample, the price would need to be at or below IDR 11,000 (US$ 0.81). Uptake decreases considerably for higher market prices, for example those prevailing in supermarkets. Only 25 respondents offered at least IDR 20,000 (US$ 1.47), the common lower bound price in the supermarket.

5.2 | The role of income

In this subsection, we first focus on the correlation of income and revealed WTP. We also explore the correlation between income and stated consumption intentions (Table 4). Considering the coefficients shown in columns 5 and 6 of Table 3, we find sizeable income effects. This is in line with our second hypothesis. From the low-income group to the middle-income group, the WTP increases by about IDR 1210 (US$ 0.09) (9%); from the middle-income group to the high-income group, the WTP further increases by around IDR 862 (US$ 0.06) (6%). Interestingly, these data indicate that income groups differ not only in revealed WTP but also in market perceptions (see Figure 3). Respondents in the lowest income group, for example, rarely (<20%) expected prices above IDR 15,000 (US$ 1.10) in the 'real' world outside the auction experiment. Notably, the relationship between price expectations and WTP is positive in all income groups. This positive relationship is also confirmed if explored in a regression framework (see column 3 of Table 3).

In contrast to revealed WTP and price expectations, there are no significant differences between the low- and middle-income groups with respect to future consumption intentions. However, results reported in column 3 (Table 4) show that respondents in the high-income group are 17% more likely to state that they intend to include organic food in their future diet than respondents in the low-income group.

[3]Looking at the distribution of the submitted prices, one can observe a large number of price bids around the interval levels of IDR 1000 (US$ 0.07), that is bids made in thousands of Rupiahs. This is not surprising as prices are typically given in thousands or five hundreds of Rupiahs on the local market.

[4]However, as noted before (Section 4.3), different purchase situations might influence the WTP to some extent.

TABLE 3 Correlates of WTP (OLS regressions)

	(1)	(2)	(3)	(4)	(5)	(6)
	WTP	**WTP**	**WTP**	**WTP**	**WTP**	**ln WTP**
Income (Ref. Income group 1 < IDR 2 m)						
Income group 2 (IDR 2 m - IDR 5 m) (=1)	2114.22***	1214.53***	809.32**		1210.42***	0.09***
	(365.99)	(405.55)	(349.50)		(409.18)	(0.03)
Income group 3 (>IDR 5 m) (=1)	3859.44***	2078.58***	1327.93***		2072.37***	0.15***
	(421.86)	(323.43)	(432.43)		(316.63)	(0.02)
Price expectations (IDR)			0.39***			
			(0.04)			
Information treatment						
Health information (=1)				428.73	95.95	0.00
				(452.64)	(335.52)	(0.02)
Environment information (=1)				98.64	−127.05	−0.01
				(504.52)	(341.22)	(0.03)
Socio-economic characteristics						
Female (=1)		−599.36	−649.96**		−619.26	−0.05
		(368.86)	(262.31)		(377.00)	(0.03)
Age (in years)		−38.23***	−21.31**		−38.22***	−0.00***
		(12.14)	(9.07)		(12.12)	(0.00)
Married (=1)		−422.72	−154.19		−405.26	−0.02
		(455.01)	(403.14)		(472.06)	(0.04)
Religion (Ref. Muslim)						
Christian (=1)		899.11***	534.48*		867.33***	0.07***
		(281.56)	(273.69)		(272.83)	(0.02)
Other religion (=1)		−705.97	−223.17		−744.27	−0.05
		(714.36)	(1161.33)		(709.27)	(0.06)
Years of schooling (in years)		−12.44	−2.12		−12.49	−0.00
		(43.73)	(40.28)		(44.50)	(0.00)

(Continues)

TABLE 3 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	WTP	**WTP**	**WTP**	**WTP**	**WTP**	**ln WTP**
Household size		−51.71	70.91		−53.20	−0.00
		(136.04)	(118.66)		(133.54)	(0.01)
Perception of env. pollution & organic cons.						
Perceived environmental pollution (=1)		715.27**	483.35		709.78**	0.05**
		(288.80)	(355.54)		(308.75)	(0.02)
Perceived benefits of organic consumption						
Healthier (=1)		677.17*	224.66		659.50*	0.06**
		(370.75)	(245.25)		(370.03)	(0.03)
Environmentally friendly (=1)		−119.51	−837.74		−125.36	0.01
		(600.62)	(769.21)		(591.24)	(0.04)
Quality (=1)		87.95	−900.44		57.15	0.01
		(740.51)	(601.92)		(716.37)	(0.05)
Purchasing behaviour and price expectations						
Past organic rice purchase (=1)		576.81*	104.95		608.51**	0.04**
		(294.02)	(280.99)		(291.38)	(0.02)
Last rice purchase price (IDR or log depending on dep. var)		0.71***	0.57***		0.71***	0.58***
		(0.09)	(0.10)		(0.09)	(0.08)
Weekend dummy (=1)	yes	yes	yes	yes	yes	yes
Intercept	11,932.90***	6532.83***	1518.18	13,750.69***	6572.24***	4.13***
	(258.16)	(1424.18)	(1243.83)	(382.04)	(1446.53)	(0.75)
Observations (N)	293	293	261	293	293	293
Adjusted R^2	0.19	0.40	0.57	0.00	0.40	0.41

Note: There are less observations for col. 3 as some respondents refused to provide price expectations if they did not know 'organic'. Robust standard errors are in parenthesis. Standard errors are clustered at the area level. ***$p < 0.01$, **$p < 0–05$, *$p < 0.10$.

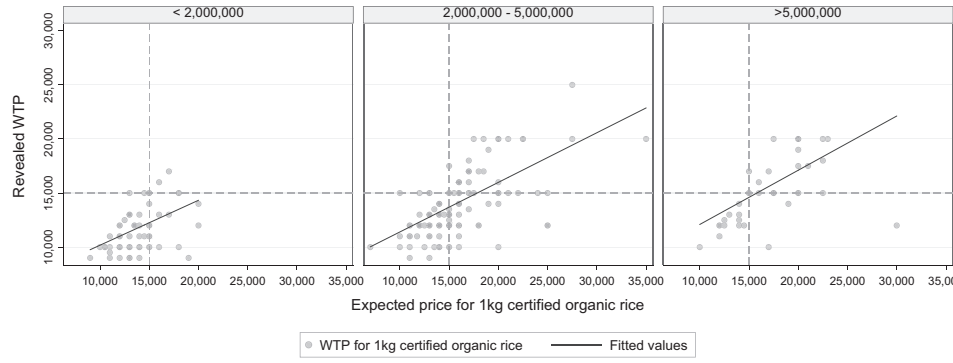

FIGURE 3 Relationship between price expectations and WTP by income group. Source: Own representation

5.3 | Effects of information treatments

Contrary to hypotheses 3a and 3b, the information treatments did not significantly influence respondents' WTP for organic rice. While Table 2 shows that the bids made in the two treatment groups were on average slightly higher than in the control group, the treatment effects are not statistically significant if they are estimated in a regression framework (Table 3). To achieve a statistical power of 80%, with a significance level of 5%, our sample size allows consideration of differences as small as IDR 889 (US$ 0.07). This implies that we cannot exclude that there are differences in average bids across the control and treatment groups; but if there are differences, they are likely relatively small. Therefore, we conclude that the information treatments were not effective in substantially raising the consumers' WTP.

Yet, interestingly looking at stated consumption intentions (Table 4), the results suggest some effects. Respondents who were exposed to the health video were 10 percentage points more likely to state that they plan to include organic food in their diet in the future. Yet, this effect is only significant at the 10% level and is not robust across all specifications (see section 5.5). The effect of the environment video is slightly higher at 14 percentage points and significant at the 5% level. We can not judge whether this is a lasting effect and hence consumers do indeed buy more organic food in the future. Moreover, stated consumption intentions might be affected by 'hypothetical' or 'social desirability' bias.

5.4 | Socio-economic characteristics and WTP

This section explores correlations between the revealed WTP and a whole range of other socio-economic characteristics as well as perceived exposure to environmental pollution, past experience with organic rice and the last rice purchase price (Table 3, col. 5 & 6). The results suggest that gender or being married is not statistically significantly correlated with respondents' WTP. Furthermore, we find no significant and consistent relationship between WTP and education or household size. While results indicate statistically significant age effects, they are quite small. A comparison of Christian and Muslim respondents shows that the WTP of Christians exceeded that of Muslims by 7% or by about IDR 867 (US$ 0.06). The differences among religious affiliations might be related to specific cultural customs such as haggling. While haggling is in some cultural or religious groups very common, Canavari et al. (2019) stated that how such practices unfold in experimental settings remains unclear. Future research could further explore whether the effects associated with religion are rooted

TABLE 4 Correlates of consumption intentions (OLS regression)

	(1)	(2)	(3)
	Consumption intention	**Consumption intention**	**Consumption intention**
Income (Ref. Income group 1 < IDR 2 m)			
Income group 2 (IDR 2 m - IDR 5 m) (=1)	0.05		−0.00
	(0.08)		(0.08)
Income group 3 (>IDR 5 m) (=1)	0.28***		0.17**
	(0.07)		(0.07)
Information treatment			
Health information (=1)		0.12*	0.10*
		(0.07)	(0.06)
Environment information (=1)		0.19***	0.14**
		(0.06)	(0.06)
Socio-economic characteristics			
Female (=1)			−0.11**
			(0.05)
Age (in years)			−0.01***
			(0.00)
Married (=1)			0.20*
			(0.11)
Religion (Ref. Muslim)			
Christian (=1)			−0.01
			(0.08)
Other religion (=1)			0.18
			(0.12)
Years of schooling (in years)			−0.01
			(0.01)
Household size			0.00
			(0.02)
Perception of env. pollution & organic cons.			
Perceived environmental pollution (=1)			0.02
			(0.06)
Perceived benefits of organic consumption			
Healthier (=1)			0.19**
			(0.07)
Environmentally friendly (=1)			0.23*
			(0.13)
Quality (=1)			0.14
			(0.09)
Purchasing behaviour and price expectations			
Past organic rice purchase (=1)			0.24***
			(0.06)

TABLE 4 (Continued)

	(1) Consumption intention	(2) Consumption intention	(3) Consumption intention
Weekend dummy (=1)	yes	yes	yes
Intercept	0.59***	0.58***	0.65**
	(0.07)	(0.06)	(0.28)
Observations (N)	293	293	293
Adjusted R^2	0.04	0.02	0.15

Note: Robust standard errors in parenthesis. Standard errors are clustered at the area level. ***$p < 0.01$, **$p < 0–05$, *$p < 0.10$.

in differences in how different religions define and interpret the interaction between humans, health and the environment.

The WTP of respondents who perceived their exposure to environmental pollution as high was on average 5% higher than the WTP of those who did not. The coefficient is statistically significant at the 5% level. This suggests that environmental awareness is positively correlated with the WTP for organic rice. Yet, only 4% of the sample said they associated organic food with environmental benefits. Table 3 further shows that reference to health as perceived benefit has a positive and statistically significant effect on respondents' revealed WTP, whereas the reference to quality and environmental benefits has no statistically significant effect.

Whether respondents had previously bought organic rice is moderately correlated with their WTP for organic rice. Interestingly, the most recent purchasing price for conventional rice also has a statistically significant relationship with respondents' WTP for organic rice. The elasticity reported in column (6), Table 3 implies that a 1% increase in the price paid for conventional rice translates into a 0.58% increase in the bid price for organic rice; this is a sizeable correlation.

5.5 | Robustness analysis

To test the robustness of our findings, we repeated the estimations with the full sample that includes the dropped observations (see Appendix S2). Table S2 in the Appendix shows that the results are very similar across both samples. Furthermore, we tested whether the WTP results are robust to different model specifications. First, to account for the possibility that respondents might have been influenced by their knowledge of price levels outside the auction, a left-censored Tobit model was estimated where bids are assumed to be censored at the stated average price level of conventional rice as the lower limit (IDR 11,465 (US$ 0.85)). Second, another Tobit model was estimated to account for the possible influence of outlier bids by bottom- and top-coding at 5% and 95% of the distribution of the submitted prices respectively. Third, we estimated an interval-censored regression model as most of the submitted bids were at intervals of IDR 1000 (US$ 0.07), which is also how prices are advertised in local markets. In estimating the model, we set the lower and upper bounds as IDR 500 (US$ 0.04) below and above the submitted bid prices. Table S3 in the Appendix reports the estimates for the OLS regression with the left-censored Tobit regression, the bottom and top-coded Tobit regression and the interval-censored regression. It can be noted that the model specification does not significantly affect the results, i.e. the estimates are similar in sign and significance across specifications.

We further tested whether the consumption intention results are robust to the exclusion of the 'maybe' answers and the estimation of a probit and an ordered probit models. Table S4 in

the Appendix reports the results. The positive effect of being in household income group 3 and the effect of the environmental video are robust across all specifications. However, the effect of the health video is not statistically significant if 'maybe' answers are excluded (col. 2). It is also not statistically significant in the ordered probit model specification (col. 5).

6 | DISCUSSION

Until now, only few studies have investigated consumers' WTP for organic food in low- and middle-income countries. Using the BDM method, we add to this literature by exploring consumers' WTP for organic rice in Indonesia. Consistent with the literature and in line with our first hypothesis, we find that respondents are indeed willing to pay a price premium for organic rice. On average, this price premium amounts to 20.1% more than what respondents paid for conventional rice the last time they bought it outside our experiment. While the magnitude of the premium differs from the findings of other studies conducted in low- and middle-income countries (e.g. Alphonce & Alfnes, 2017; Nandi et al., 2016; Probst et al., 2012), our study provides further support to the general finding that consumers are also willing to pay a price premium in low- and middle-income countries. The findings also confirm our second hypothesis that the WTP for organic rice is increasing in income. While this is in line with studies from India (Nandi et al., 2016) and Vietnam (My et al., 2018), it is in contrast to prior research in Indonesia (Wahida et al., 2013). The latter is particularly surprising as the sample under study is very similar to ours, urban consumers in Java, Indonesia. One potential explanation could be that we used an incentive-compatible elicitation approach while Wahida et al. (2013) investigated stated WTP. Potentially, poorer consumers are more likely to state prices they would like to pay rather than prices they can afford to pay.

For Indonesia, Slamet et al. (2016) showed that both environmental concerns and health concerns are highly related to respondents' stated past organic purchase behaviour. However, there are few empirical studies on the role of these food attributes in determining consumers' WTP for organic food. The few existing studies have produced rather mixed results (e.g. Batte et al., 2007; Rousseau & Vranken, 2013; Wier et al., 2008). Furthermore, whether placing additional emphasis and providing more information on health-related or environmental benefits can be effective in increasing consumers' willingness to pay a price premium for organic food remains unclear. Related studies on biofortified food found positive effects of additional nutritional information in Uganda (Chowdhury et al., 2011) and Mozambique (Oparinde et al., 2016). Yet, the extent to which these results are transferable to the context of organic food and to Indonesia remains unclear. Using a randomised information treatment design, this study further examined whether WTP can be raised by providing respondents with information about the health and environmental benefits of organic rice. Maybe not completely unexpected given the light form of the treatments, we found that the information treatments did not significantly increase respondents' WTP. There are several possible explanations for the absence of a treatment effect in our study. First, it is possible that the video on the health benefits of organic rice simply did not provide enough new information. Maybe respondents already concluded from the explanatory introduction that organic products have positive health effects as they were told that these are produced without chemicals. This is consistent with the existence of a statistically significant correlation between perceived health benefits and respondents' WTP. It is also in line with the finding that health benefits were the most frequently mentioned positive attribute of organic food among all respondents, irrespective of the treatment group. The results might be interpreted as a signal that health attributes are a relevant factor for consumers' WTP but that our video was not effective in further increasing respondents' valuation of these benefits. Yang et al. (2021), for example, found that food safety concerns were listed as most important among Indonesian participants in an online survey.

Second, the generally low level of environmental awareness among respondents might explain why the video on environmental benefits was also ineffective in raising their WTP. A study in China also found that highlighting the environmental benefits of organic food had a positive effect only among respondents who had previously reported strong pro-environmental values (Loebnitz & Aschemann-Witzel, 2016). Third, and related to the previous two explanations, it could be that the effectiveness of information provision was limited by the mode of information delivery. It may well be that increasing consumers' valuation of a benefit requires repeated exposure to information and persuasive arguments and that a one-time exposure is not sufficient. Furthermore, consumers might respond differently to information about the potential benefits of organic food versus the potential negative aspects associated with conventional food consumption and production. Future research on different communication methods could explore these aspects in more detail.

Interestingly, we find a positive and statistically significant relationship between exposure to the environment video and stated consumption intention. Given the absence of a significant effect on revealed WTP, this could be interpreted as a signal for social desirability bias. Potentially, respondents expected that consumption in line with environmental protection is socially desirable (or desired by the research team) but placed too little value on it for themselves to adjust their WTP for organic rice. This interpretation is in line with Wier et al. (2008) who demonstrated that there is a significant discrepancy between stated preferences for public good attributes such as environmental benefits and actual purchase behaviour among Danish survey respondents. The contrasting effect of environmental information on stated consumption intention and revealed WTP underlines the importance of a careful interpretation of the effect of information and preferences for environmental protection when relying on stated consumption or WTP measures.

The results further suggest a strong positive relationship between the most recent purchasing price for conventional rice and the WTP for organic rice. Considering that the price consumers pay for conventional rice reflects their WTP to pay for rice quality, we could interpret this as a signal that consumers who are willing to pay for higher quality are also willing to pay more for organic food. Based on field observations, examining the quality of rice is indeed a central part of the rice purchasing process.

7 | CONCLUSION

To our knowledge, this study is the first to assess consumers' WTP for organic rice in Indonesia using an incentive-compatible approach. Sustained local demand is an important precondition to increase adoption rates of organic farming among smallholder farmers. Our results suggest that there are opportunities to promote organic rice among urban and suburban Indonesian consumers. Forty-four per cent of the respondents were willing to pay a price equal to or higher than IDR 15,000 (US$ 1.10), a price that farmers commonly ask for organic rice directly purchased at the farm gate, which is not uncommon in Indonesia. Even allowing for a potential desirability bias, which may have inflated bid prices to some degree, this represents a considerable proportion of urban and suburban consumers. This also provides support for the argument that the national government should reconsider its current focus on export markets and provide more support for developing the local market. However, while most respondents (63%) stated that they knew where they could buy organic rice, many of these stated that it was sold in supermarkets. Given that few respondents (8.5%) indicated they were willing to pay the higher prices prevailing in supermarkets, this could be an obstacle to the widespread integration of organic rice into consumers' diets. Hence, increasing the availability of organic rice at other retail outlets and traditional markets, where prices are lower, could enhance the demand for organic rice. More competition could

also help to drive down the markups that supermarkets currently apply. In addition to the price element, making access to organic products more convenient, that is at places where consumers usually shop, could also enhance demand. Srinieng and Thapa (2018), for example, found that consumers in Bangkok related low consumption of organic vegetables to the unavailability of vegetables of choice and the limited number of stores selling organic food. Kini et al. (2020) found that the distance to the purchase location is negatively correlated with organic demand in Burkina Faso.

Our results suggest that IDR 15,000 (US$ 1.10) is a threshold price for many consumers in our study area. It should be borne in mind that we used certified organic rice, and 88% of respondents stated that certification is important to them. However, obtaining certification is very expensive, especially for smallholder farmers. Currently, many farmer groups that offer certified organic rice receive financial support from the government or other institutions to pay for certification. Without this support, farmers would have to pass on the costs of certification to the consumer and this could decrease uptake. Policymakers are encouraged to continue providing financial support for certification or to reduce the costs for certification with the aim of keeping the price for organic rice at or below IDR 15,000 (US$ 1.10). Furthermore, alternative labels such as the 'participatory guarantee system', which relies on community self-control, could be a promising alternative to facilitate initial market access for farmers.

Both the absence of positive effects of information provision and the positive income effect have further implications for public and private marketing strategies for organic food. As discussed above, the absence of effects of information provision in our study could indicate that short and only basic messages about health benefits are insufficient in further raising consumers' WTP given that most of them already have a basic knowledge of the health benefits of organic food. Furthermore, while other studies (e.g. Rousseau and Vranken (2013) for Belgium) found that environmental messages seem to be an important driver of demand for organic food, they appear to be of lesser importance in our study context. Given a relatively low level of environmental awareness (demonstrated by responses to the question about pollution in our study), it is questionable whether focussing on environmental benefits is a suitable strategy to raise consumers' WTP for organic food in Indonesia or other low-income countries. However, we found that the WTP of respondents who perceived their exposure to environmental pollution as high was 5% higher, on average, compared with other respondents. We recommend that information provided on health benefits should be more in-depth and detailed than in our study and that consumers should be sensitised to environmental pollution through agriculture. Sustainability labels could be an important tool in this respect (see e.g. Van Loo et al., 2015).

Finally, we find a strong positive relationship between the most recent purchasing price outside the experiment and the WTP for organic rice. Since rice prices reflect the quality of rice, this suggests that it is important for organic farmers to use rice varieties that also command a price premium when they are conventionally grown.

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DATA AVAILABILITY STATEMENT

The datatsets that were used for this study as well as the Stata code are available from the corresponding author upon a reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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